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ABSTRACT

This publication consists of a brief essay on the scientific analysis of organizational interaction and structures and a bibliography of relevant publications. The author discusses the application of mathematical ordering and analysis to the study of organizations and examines the relationship between organizational structure and interpersonal communication. Bibliographic citations are listed alphabetically by author's name. (JG)

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TOWARDS A SCIENTIFIC STUDY OF INFORMATION AND COMMUNICATION THEORY RELATIVE TO GROUPS AND ORGANIZATIONS: A Bibliographic Essay

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TOWARDS A SCIENTIFIC STUDY OF INFORMATION AND COMMUNICATION THEORY RELATIVE TO GROUPS AND ORGANIZATIONS: A BIBLIOGRAPHIC ESSAY

by

Anthony G. White

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Central to the thesis of this bibliographic collection is that there exists a growing body of literature leading toward the orderly, scientific analysis of group and organizational interactions and structures. The purpose should be self-evident: if a field of study is sufficiently surveyed and understood, it should be possible to define parameters within which, given certain initial and boundary conditions, actions and reactions can be predicted.

The study of interpersonal actions - i.e., the rules, roles and relationships within groups - lies within the area of sociology. With the exception of statistical tests, however, sociology and its subfields have long resisted mathematical ordering and analysis. While mathematical sociology (sociometry) is a growing field, there is a reluctance on the part of social scientists (and perhaps a lack of training) to view the social group as a mathematical entity.

Organizations, as special subcategories of groups, have within the last four decades come under more intense study as a key to human interactions (and in part as a reaction to communication and organization difficulties encountered during World War II). Organizations can be intuitively thought of as structured groups created usually to perform a task or given set of tasks, and knowing how they operate can lead to development of the tools for dealing with the larger category of "groups."

For an area of study to be considered "scientific," two basic elements are required. First, there must exist or be capable of existing a data base generated in an orderly, replicable manner. Second, there must exist analytic tools for working with the data base - tools which could be wielded in the same manner by different investigators to yield the same results.

Organizations have thus come under close scrutiny because they are so plentiful, at least in American life. Every aspect of social, political, economic and cultural facets of our lives are tied to organizations of one kind or another. Through them, we can come to a better understanding of curselves and the way in which we deal with other people.

In each organization there is at least one structure, defined by the genetic document of the organization (constitution, charter, contract, articles of incorporation)

or by evolution over time. This structure sets limits on who gives orders to whom, the role of certain individuals (comptroller, foreman, board director), and so on. Other structures within the formal one are possible, either formal (cells, task forces, project teams) or informal (cliques, discussion groups).

For the organization to function within its environment, it must be capable of receiving external or internal stimuli, of processing that stimuli into understandable patterns (information), choosing the correct response pattern ("correct" usually in the context of survival), reacting, receiving feedback from the reaction, and modifying the organizational response or structure to meet existing needs.

Involved herein is the process of communication, which can be loosely thought of as the sending, processing, comprehension and reaction to information. Not only must this process be looked at in the sense of the organization, but in the sense of individual members of that organization as well.

Additional concepts which are wrapped up in, and necessary to, this communication process are: leadership, status role, task, power, cliques, authority, environment, filtering, feedback, morale, noise (interference with information transmission or reception), boundary conditions, redundancy, centrality of structure, group

size, individual attitudes, information distribution patterns, risk, expectations, adaptability, duration, adgenda, stress, commitment, individual satisfaction, and confidence. The consideration of all these factors is obviously no easy task.

The study of these concepts in the organizational and communication context can analytically be handled by game theory, computer simulations, Markov chain analysis, probability theory, graph theory, matrix algebra, set theory, and the higher mathematics of information theory - including advanced calculus. The number of social scientists capable of using these tools is not large, but is growing with each new graduating class.

The study of organization can help answer some questions that are important both in the decision-making process and interpersonal actions which affect us all, such as: What is leadership? How can leadership be cultivated, and best utilized? Why do some messages flowing through organizations get "scrambled," while others pass through crystal-clear? What makes people satisfied (or dissatisfied) in their organizational niches? How can the individual best manipulate an organization to achieve maximum results? What stresses can an organization take before it ceases to function properly? What do some organizations grow and prosper and some decay when placed in the same environment? What can individuals do better than an

organization, and vice versa, and why? These questions and others can best be answered when the state of the art of mathematical applications reaches that point when, if a social scientist desires to study a group reaction to a given situation, he could derive the answer from his desk-top computer.

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